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## A SYSTEMATICAL AND MORPHOLOGICAL STUDY OF UTAH BOMBYLIIDAE, WITH NOTES ON SPECIES FROM INTERMOUNTAIN STATES[1]

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(Concluded from Vol. 8, No. 1.)

10. Pile and tomentum deep red-bronze and black except for tufts of white pile behind wings on thorax, and on abdomen a small tuft on sides at front of segment 2; tufts of white scales on lateral margins of segments 3 to 6, and a band of white tomentum on last abdominal segment of male; basal half of wings dark blackish brown except for curved subhyaline band across wing just posterior to the origin of Rs; a subhyaline spot in base of cell R-1 and apex of Cu-2; wing narrowly hyaline in a band from near base of cell 1R-3 to posterior margin; a hyaline spot in 2M-2, and most of 2R-3 and R-4 hyaline ..... **decora** O. S.

Distribution: Utah, new record: Utah Co., Provo (Johnson).

Colorado: Ft. Valley School, 6000 ft., Aug. 1932 (Hayward).

Cross bands of black and golden brown tomentum mixed with tufts of white on nearly every segment, and a band of white on base of segment 2; tomentum of venter black and white or golden; white pile on segments 1 and 2, black on rest; one to three hyaline spots in cell R-1; three hyaline bands across wing in same relative positions as subhyaline and hyaline bands above, but these bands are wide and at apex of wing cell 2R-3 is entirely hyaline and R-4 nearly so ..... **capucina** (Fab.)

Distribution: Utah, new records: Salt Lake Co., Salt Lake City (T. R. Chamberlin); Utah Co., Provo (Johnson); Sevier Co., Richfield (Rowe); Iron Co., Miner's Peak, July 10, 1919.

Idaho: Island Park (Beck).

Wyoming: Lake Hotel, Yellowstone National Park (Tanner).

11. Cell R-1 hyaline at apex; legs black ..... 12

Brown of wings extending to apex of cell R-1, with faint hyaline spot near knee of vein R-2+3;

brown reaches margin of wing in cell 1A, and nearly reaches edge along vein M-2; sybhyaline spots in base of cells R-1 and R; legs red with black tarsi; abdominal tomentum white on segments 2 and 4; cross bands of black and rusty golden on rest; yellow pile on segment 1 and 2, reddish on 3, black on 2 to 5 .... **fascipennis** (Say)

Distribution: Michigan: Douglas Lake, Cheboygan Co., August, 1929 (C. J. D. Brown).

12. No hyaline spots in the black, outline of black very clear-cut distinct, and in two bands across wing; cells R, 2M, 1A, and 2A broadly hyaline; pile and tomentum distinctly black and yellowish white, with some golden tomentum on mesonotum and base of scutellum; all tomentum broadly ovate ..... **eremita** O. S.

Distribution: Utah, new record: Utah Co., Utah Lake, East Side (Tanner), Provo, (Maughan, Johnson).

Hyaline spots on medial cross-vein, free part of Cu-1, base of M-3, and a spurious cross-vein present in cell R-5 surrounded by hyaline; outline of brown somewhat blurred, and not reaching edge except in cell 2A; base of wing to base of cell 1M-2 brown except on veins noted above; pile and tomentum black and white on abdomen, yellow and black on thorax; black tomentum hair-like ..... **divisa** (Coq.)

Distribution: Utah, published records; Boxelder Co., Promontory, July, 1930 (Knowlton), Corinne, July, 1929 (Knowlton), Kosmo, July, 1930 (Knowlton and Janes), Snowville, September, 1930 (Knowlton).

**Exoprosopa** species

Seven distinct species all too rubbed or broken to identify.

Distribution: Utah: Utah Co., 2 species, Provo (Stanton): Washington Co., Zion National Park (Tanner), Santa Clara, two species (Tanner).

Texas: Roanoke, June 1931 (Beck and Call).

Mexico: Colonia Dublan, Chih, July, 1931 (Beck and Call).

Colorado: Ft. Valley School, 6000 ft., August, 1932 (Tanner).

**Dipalta** Osten Sacken 1877

In **Dipalta** O. S. the Rs branches near the r-m cross-vein as in the preceding genera, and the sectoral cross-

vein divides cell R-3. Vein R-2+3 is strongly curved S-shaped and often bears numerous spurious veins (Fig. 28). The wings are mottled with brown. Antennae without a terminal style.

This genus is represented by only one species in Utah . . . **Dipalta serpentina** O. S. The wings are almost completely spotted with brown against a hyaline background. The vein R-2+3 is strongly contorted like a recumbent S, and bears usually one or more spurs. Length, 9-11 mm.

Distribution: Utah, new records: Utah Co., Spanish Fork Canyon (Hardy), Provo (Johnson); Washington Co., Zion National Park (Tanner, A. M. Woodbury).
Colorado: Estes Park, 7000 ft., August 1932 (Jeppson).

**Lepidanthrax** Osten Sacken 1886

The genus is separated from **Villa** Lioy by having the contact of 1M-2 and Cu-1 longer than the free part of Cu-1 (Fig. 36); the base of the third antennal joint is short, onion-shaped, with the styliform portion slender and almost bristle-like (Fig. 15). The proboscis projects at least one-fourth its length beyond the oral margin, and shows the characteristic structure for the Bombyliidae (Fig. 7). The front tibia are provided with bristles and the sides of the abdomen are furnished with long scales.

Apparently four species in this genus have been taken, but all are too badly rubbed for identification, and only one has been determined tentatively.

**Table of Species**

1. Wings spotted with black ..... 2
   Wings almost entirely hyaline (two species belonging to **inauratus** group of species) ..... 3
2. Base of wing to middle of cell 2M, costal, and radial cells entirely black; black spots on bases of veins M-3, Cu-1, R-2+3. R-4, each end of the medial cross-vein, on spurious cross-vein in cell R-5, in apex of cell R-1, and on apex of vein R-2+3; head entirely black .... **disjuncta** Wied?
   Distribution: Mexico: Garcia-Dublan Road, Chih., July 1931 (Beck and Call).

   Distribution of wing color almost identical, except that at least two-thirds of vein R-2+3 is surrounded by black, and the apical fourth of cell R-1 is black with a hyaline spot; face and first

two antennal joints partly reddish; proboscis projects about 1/3 of its length beyond epistoma (rubbed specimen)....**species dubius** (1)

Distribution: Utah, Washington Co., Santa Clara (Tanner).

Note: Wing pattern very similar to **L. lutzi** Curran, but that species has head entirely black, and proboscis projects half its length beyond the epistoma.

3. Larger species—8 mm.; wings with brownish spots on base of vein R-2+3, the r-m cross vein, middle of cell R-1, and base to middle of cell R ..... ..... **species dubius** (2)?

Distribution: Utah: Utah Co., Provo (Johnson).

Small species—4.5 to 5 mm.; wings hyaline ..... ..... **species dubius** (3)?

Distribution: Utah, Snowville, June 28, 1929 and June 7, 1930 (Knowlton).

## **Villa** Lioy (before 1763)

This genus **Villa** Lioy (**Anthrax** of authors) may be distinguished from closely related genera by the following characters: The forking of the radial sector takes place at or near the r-m cross-vein, and never at a greater distance than the length of that vein; a sectoral cross-vein may be present, but is usually absent; contact of cells 1M-2 and Cu-1 not longer than the base of Cu-1; cell 1A is not widest at its apex (Fig. 27). The antennal style is minute or absent (Fig. 9), and there are no pulvilli in most of the species. The species of this genus are more or less densely clothed with pile and tomentum, and the face is usually provided with tomentum.

As a whole the genus may be divided into two great groups, the clear-winged species, and those with more or less smoky or mottled wings. The color and extent of those portions which are not hyaline are used in separating many of the species.

The proboscis varies in length considerably, but is usually short. The face varies very much in shape in this genus. It may be rounded and scarcely visible from the side as in **V. alternata** (Say) (Fig. 1), greatly produced (Fig. 44), or most any degree of projection between these two. It varies in color from black to light yellow, and may be variously marked. The antennae also vary considerably. That of **V. alternata** (Say) (Fig. 9) is perhaps typical but the styliform portion of joint three

is of many lengths, and the base of that joint varies in shape.

This genus is by far the largest in number of species, and has the greatest range of any of the genera of Bombyliidae. Thirty-four species from this genus are included here, of which 32 have been taken in Utah. One of these species is new to science and is described as **Villa utahensis** n. sp. Type and paratypes of this species are in the collection of the Brigham Young University, and one paratype is in the collection of R. H. Painter. One other species may be new but belongs to a veriable group of species and subspecies, so is left for future study.

**Table of Species**

1. Cell 1A wholly pure hyaline; wings hyaline, sometimes marked with brown; scutellum wholly black ..... 2

   Cell 1A more or less brown or smoky; wings largely or wholly brown or black, or distinctly smoky; scutellum black or red ..... 15

2. Wings, except sometimes costal, base of cells R-1 and R wholly hyaline; sometimes a brown cloud on veins at bases of cells R-3 and R-5, but never any other portion of the wing ..... 3

   Wings marked with brown on other parts than those above mentioned especially on medial cross-vein and free part of Cu-1 ..... 12

3. Claws of front tarsi much smaller than those of other tarsi; abdomen with black pile ..... 4

   Claws of front tarsi nearly as long as those of other tarsi; face projecting; tomentum and pile of thorax and abdomen orange with some black tomentum on 2-5, dorsally, and segments 6 and 7 white pilose and tomentose in male ..... **nigronasica** Painter

   Distribution: Utah, published record: Paratype, Juab Co., Dividend, September 1 (Spalding). New Record: Utah Co., Provo (Johnson).

4. Abdomen provided with black tomentum, without long scales, and having black pile on some of the segments anterior to the fifth ..... 5

   Same, except abdomen destitute of black pile on sides of any segment anterior to the fifth ..... 10

5. Front tibiae provided with bristles ..... 8

   Front tibiae destitute of bristles; abdomen without bronze-colored tomentum; tomentum on base

of wings in front largely or wholly black; that on the occiput usually white; base of wings destitute of an epaulette of silvery scales in the male ..... 6

6. Last two or three abdominal segments destitute of dark reddish brown tomentum, which is darker than remaining tomentum except that which is black ..... 7

These segments provided with dark reddish brown tomentum ..... **concessor** (Coq.)

Distribution: Utah, new record: Utah Co., Provo (Johnson).

7. Bands of light colored tomentum on abdomen wide; a yellow tomentose triangle in front of scutellum; legs black; light colored tomentum of dorsum all of about the same shade, whitish yellow to golden ..... **lateralis** (Say)

Distribution: Utah, published records: Cache Co., Logan, 1929 (Pack), Logan Canyon, June 1925 (Hall); Boxelder Co., Promotory, July 1929 (Knowlton); Weber Co., Ogden, September 1929 (Knowlton); Sanpete Co., Mt Pleasant, September 1929 (Pack); Iron Co., Miners Peak, June 1929—reported as **Sparnopolius fulvus Wied.**

New records: Rich Co., Bear Lake Valley, West Side (Hayward); Cache Co., Hyrum Canyon, August 1925 (Knowlton); Colinston, August 1931 (Knowlton), Tony Grove, Logan Canyon (Hall), Fairview (bred from cutworm); Boxelder Co., Garland, Sept. 4, 1930 (Knowlton and Janes), Rosette, August 11, 1931 (Knowlton) Corinne (Bowen and Knowlton); Utah Co., Provo, September (Tanner, Hayes); Garfield Co., Bryce Canyon (Tanner); Iron Co., Parowan, July 1929, (Tanner), Parowan Canyon, July 18, 1919, Dry Canyon Aug. 3, 1919, Little Salt Lake, July 19, 1919; Washington Co., Bellvue, June 1929, Zion National Park (Tanner, Woodbury).

Colorado: Ft. Valley School, 6000 ft. August 1932 (Tanner); Estes Park, 7000 ft., August 1932 (Tanner, Jeppson); Mesa Verde National Park, August 1925 (C. J. Drake).

Light colored tomentum not all of about same shade

—all white except on abdominal segment 7 and on prescutellar triangle....**lateralis arenicola** John.
Distribution: Utah; new records: Tooele Co., Trout Creek, Deep Creek Mts. (Tom Spalding); Utah Co., Provo, (Johnson).

8. Tomentum of abdomen never bronze-colored, or if approaching this color, then the third segment is furnished with light colored tomentum ..... 9

Tomentum of abdomen largely, of thorax and scutellum wholly, bronze-colored; third segment of abdomen destitute of light colored tomentum; legs black ..... **aenea** (Coq.)
Distribution: Utah, new records: Utah Co., Provo (Johnson, Hasler); Washington Co., Zion National Park, (Tanner).

9. Black and light colored tomentum of abdomen forming distinct alternating crossbands; pile on sides of fourth segment largely or wholly whitish; tomentum of occiput yellowish; base of wing of male furnished with an epaulette of silvery scales; last segment of male destitute of silvery tomentum; pile of venter of thorax light in color ..... **alternata** (Say)
Distribution: Utah, published records: Boxelder Co., Bear River City, September 1927 (Knowlton).
New records: Cache Co., Logan Canyon; Salt Lake Co., Salt Lake City, Sept. 1915 (Miles); Utah Co. Provo Canyon (Spalding. Tanner), Aspen Grove (Tanner), Provo (Gloria Tanner, Johnson), Rock Canyon (V. M. Tanner); Sanpete Co., Indianola (V. M. Tanner), Box Canyon near Maple Canyon; Millard Co., Sand Dunes, Lynndyl, Sept. 1926 (V. M. Tanner); Sevier Co., Richfield, June 1930 (Rowe), Fish Lake; Garfield Co., Widtsoe (V. M. Tanner); Iron Co., Miners Peak, July 10, 1919, Parowan (V. M. Tanner), Navajo Lake (Hayward); Washington Co., St. George (V. M. Tanner, A. M. Woodbury), Zion National Park (Woodbury).
Michigan: Douglas Lake, Cheboygan Co., (C. J. D. Brown).
Iowa: Ames, July 1930 (Beck).
New Mexico: Jemez Springs, August 1914 (Westgate).

Colorado: Ft. Collins, Rist Canon, August 1925 (C. J. Drake).

Differs from **alternata** (Say) in having pleura, pectus and venter black pilose, except for pile on segment four of abdomen, which is white in color on the lateral margins ..... ..... **alternata nigropectus** (Cress.)

Distribution: Utah, new record: Wayne Co., Hanksville (Stanton).

10. Front tibiae provided with bristles; pile orange or yellow ..... 11

Front tibiae occasionally destitute of bristles; pile predominantly white, venter destitute of a cross-band of black tomentum on base of third segment, but with such a crossband at bases of fifth and sixth segments; bases of wings in male furnished with an epaulette of silvery scales; the last abdominal segment without such scales ..... **molitor** (Loew)

Distribution: Utah, published records: Weber Co., Ogden, Sept. 1929 (Knowlton); Sanpete Co., Mt. Pleasant, Sept. 1929 (Pack), bred from cutworm.

New records: Sanpete Co., Fairview 1929, bred from cutworms; Utah Co., Provo (Johnson); San Juan Co., Ute Mt. (Kartchner); Iron Co., Parowan (Tanner); Washington Co., St. George (A. M. Woodbury).

Wyoming: Yellowstone National Park (Tanner).

11. Tomentum of abdomen dense, forming cross-bands; sides of segments five and six usually provided with black pile; base of wings of male furnished with an epaulette of silvery scales; last abdominal segment destitute of such scales; venter without cross-bands of black tomentum, the yellowish pile and tomentum of abdomen sometimes dark, but never deep golden; the pile mostly erect and bushy ..... ..... **agrippina** (O. S.)

Distribution: Utah, new records: Summit Co., Tryol Lake, Uintah Mts.; Salt Lake Co., Salt Lake City (Miles); Utah Co., Provo, June (Hayward, Johnson), Rock Canyon (Hayward), Spanish Fork (Hardy), Salem (Hardy) Sanpete Co., Indianola (Tanner);

Iron Co., Dry Canyon, Aug. 3, 1919, Miners Peak, July 24, 1919, Parowan, July 24, 1919; Washington Co., Santa Clara (Tanner), Zion National Park (A. M. Woodbury), St. George, (Woodbury).

Colorado: Mesa Verde National Park (Anson Call, Jr.).

Tomentum of abdomen sparse, not forming distinct cross-bands; pile of dorsum and sides abundant, bushy, and golden in color; light tomentum golden in color and hair-like rather than scale-like ..... **fulviana** (Say)

Distribution: Utah, new record: Utah Co., Aspen Grove, 10,000 ft. (Tanner, Johnson).

Colorado: Pingree Park (Tanner, Hayward, Jeppson), Estes Park, 7000 ft., August 1932 (Jeppson, Tanner, Hayward).

12. Proboscis not or scarcely projecting beyond oral margin; front tibiae without bristles; claws of front tarsi minute ..... 13

Proboscis projecting from one-fourth to one-half its length beyond the oral margin; front tibiae provided with bristles; antennae wholly black; face black, retreating below; yellowish color fills cells C and extends into R and R-1; a brown cloud on veins at bases of cells R-3, R-5, 2M-2, and Cu-1 ..... **caprea** (Coq.)

Distribution: Utah, new record: Washington Co., Zion National Park (Tanner, Johnson), Hurricane, June 14, 1919.

13. Posterior femora and tibiae destitute of long scales 14

Posterior femora and tibiae having a dense fringe of long scales both below and above; abdomen provided with dark golden tomentum ..... **inops** (Coq.)

Distribution: Utah, new record: Utah Co., Provo (Johnson).

14. Face and first antennal joint red; tomentum of legs golden brown, of body white and golden brown ..... **eudora** (Coq.)

Distribution: Utah, Washington Co., Zion National Park, July 1932 (Johnson, Jeppson).

Face and antennae black, except for oral margin which is yellowish; tomentum of legs black, of segments two and three of abdomen banded

white and yellowish-brown shading to black; segment four entirely yellowish-brown to black ..... **species dubius**

Distribution: Utah, new records: Utah Co., Provo (Johnson); Garfield Co., Bryce Canyon (Tanner); Washington Co., Zion National Park (Tanner).

Apparently the same as **species** above except that no black tomentum is present on the abdominal segments mentioned ..... **species dubius**

Distribution: Utah, new record: Utah Co., Provo (Johnson).

15. Scutellum wholly black ..... 16
Scutellum partly or wholly reddish ..... 33
16. Abdomen destitute of black tomentum; face, femora, and tibiae partly or wholly reddish; apex of wings beyond base of cell R-4 wholly hyaline ..... 17
Abdomen provided with black tomentum ..... 18
17. Wings with a brown cloud at base of cells R-4 and M-1, front black, reddish tomentose; face red at sides, black above; proboscis not projecting ..... **eurhinata** Bigot

Distribution: New Mexico: Jamez Springs, 1914 (J. Westgate).
Colorado: Pikes Peak, 9500 ft., August 1932 (Jeppson).

Wings without a brown cloud at base of cells R-4 and M-1, brown of wings nearly or quite fills entire base of cell 1M-2 to the r-m cross-vein and does not reach base of cell R-4; front tibiae provided with bristles; claws of front tarsi well developed ..... **edititoides** Painter

Distribution: Utah, Published record: Paratypes, Juab Co., Dividend, August 17, 20, 24; Sept. 1, 2, 17 (Spalding); New record: Utah Co., Spanish Fork (Hardy), Provo (Johnson).
Colorado: Ft. Valley School, 6000 ft., August 1932 (Tanner).

18. Abdomen with black tomentum only on segment two ..... 19
Abdomen with black tomentum on other segments than two ..... 20
19. Face yellowish red; legs light red, with tips of tarsi black; brown just reaches base of cell

R-5 ..... (a) **Villa** sp. near **edititia** (Coq.)
Distribution: Utah, new record: Garfield Co., Bryce Canyon (Tanner).

Face black shading to yellow at sides; legs reddish brown with black tarsi; brown fills basal third of cell R-5 ..... (b) **Villa** sp. near **edititia** (Coq.)
Distribution: Utah, new record: Utah Co., Sept. (Tanner); Provo (Hayward).

20. Face, femora, and tibiae partly or wholly reddish 21
Face wholly black ..... 24

21. Brown of wings does not reach base of cell R-4 along the veins; front tibiae with bristles; face produced below ..... 22

Brown of wings reaches base of cell R-4 along the veins; outline of the brown not distinct; vein R-2+3 strongly curved s-shaped before its apex ..... **mira** (Coq.)
Distribution: Utah, new records: Cache Co., Logan, Aug. 5, 1931 (Knowlton); Washington Co., Zion National Park (Tanner, A. M. Woodbury).

22. First antennal joint reddish, most of face and sometimes front red; scutellum and first abdominal segment with whitish tomentum ..... 23

Antennae, front, and face, except sides of oral margin black; tomentum of scutellum and first abdominal segment yellowish to yellow-brown, but never all light yellow ..... **ephebus** (O. S.)
Distribution: Utah, New record: Box Elder Co., Portage, Sept. 19, 1931 (Knowlton); Utah Co., Provo (Johnson).

23. Proboscis projecting half its length beyond the oral margin (Only one specimen) ..... **syrtis** (Coq.)?
Distribution: Utah, new record: Utah Co., Provo (Johnson).

Proboscis never projecting half its length beyond the oral margin ..... **syrtis** (Coq.)
Distribution: Utah, new record: Utah Co., Provo (Johnson).
Note: This is the characterization of **syrtis** as given by Coquillett. The specimen listed as **syrtis** above is apparently identical except for length of proboscis.

24. Pile and tomentum of head and abdomen wholly black; base of wings to tip of cell 1M-2 black-

ish; the apex hyaline ..... **atrata** (Coq.)
Distribution: Utah, new records: Salt Lake Co., Salt Lake City, August 1930 (T. R. Chamberlin); Utah Co., Provo (Johnson), Utah Lake, East Side (Beck)
California: Harbor City (Beck).

Pile and tomentum of head and abdomen partly white or yellowish ..... 25

25. Apex of wings beyond base of cell R-4 distinctly hyaline and brown; frequently three submarginal cells ..... **sinuosa jennickeana** (O. S.)
Distribution: Utah, new records: Cache Co., Sept. 1920 (King), Tony Grove, Logan Canyon (Hall); Davis Co., Bountiful (Pack); Wasatch Co., Summit Daniels Canyon, 8000 ft. (Brown); Utah Co., Aspen Grove (Tanner), Provo Canyon, Provo (Maughan); Sevier Co., Fish Lake; Iron Co., Dry Canyon, Aug. 3, 1919, Miners Peak July 9-10, 1919; San Juan Co., Bear's Ears, Elk Ridge (Anson Call Jr.); Garfield Co., Bryce Canyon (Tanner); Washington Co., Zion National Park (A. M. Woodbury).
Idaho: Paris (Hayward).
Colorado: Pingree Park, (Tanner, Jeppson, Hayward); Estes Park, 7000 ft., August 1932 (Jeppson, Tanner), August 1924 (Drake and Hattes).
New Mexico: Jemez Springs (J. Westgate).
Wyoming: Jenny Lake, Teton National Park (Tanner).

Apex of wings beyond base of cell R-4 wholly hyaline ..... 26

25. Wings destitute of a brown cloud at base of cell R-4 ..... 27

Wings with a brown cloud at bases of cells R-4 and M-1; front tibiae with bristles; first antennal joint one and one-half times the length of second, base of third joint onion-shaped; face much produced below, tomentum of sides of occiput white, of top yellowish ..... **cauter** (Coq.)
Distribution: Utah, new record: Garfield Co., Widtsoe (Tanner).
Note: See Figures 41, 44, 45, 53, and 54 for drawings of this species.

27. One-fourth or less of cell 2A hyaline ..... 28

One-half or less of cell 2A hyaline, apex of cell 1A broadly hyaline; veins at bases of these cells boardered with subhyaline; pulvilli large, face retreating ..... **catulina** (Coq.)

Distribution: Utah, published records: Salt Lake Co., City Creek Canyon, 1925 (D. G. Hall); Tooele Co., Tooele, June 1929 (Knowlton).

New records: Cache Co., Wellsville Canyon, June 1926 (Tanner); Box Elder Co., Snowville, June 7-8, 1930 (Knowlton); Utah Co., Provo (Jeppson, Tanner, Johnson, Rowe), Aspen Grove (Tanner); Washington Co., Zion National Park (Tanner, A. M. Woodbury).

Colorado: Mesa Verde National Park (Anson Call Jr.). Wyoming: Burnt Fork (Brown); Green River (Beck); Hoback River (Beck).

California: Stanford University, Palo Alto (Tanner).

28. Pulvilli small; ground color black (may be red on abdomen) with some reddish orange pile and tomentum on thorax and abdomen ..... 29

Pulvilli large; all black, with black and white or brownish pile on thorax and abdomen ..... 30

29. Face much protruded below; claws of front tarsi as large as those of other tarsi; front tibiae provided with spines ..... **spaldingi** Painter

Distribution: Utah, Published record: Paratypes, Dividend, Juab Co. (Tom Spalding); and Bryce Canyon, Garfield Co., (Tanner).

Face protruded somewhat below; claws of front tarsi small; front tibiae smooth .. **cypris** (Meigen)

Distribution: Iowa, Ames, July 1930 (Beck).

30. Brown of wings fills base of cell 1M-2 to the r-m cross-vein ..... 31

Brown of wings does not fill base of cell 1M-2 to the r-m cross-vein. Cross-veins within brown part not distinctly bordered with subhyaline; reddish band of tomentum at apex of each abdominal segment, rest mixed reddish black; pile of dorsal of abdomen white on first four segments, black and white on rest .... **eumenes** (O. S.)

Distribution: Utah, new record: Wasatch Co., Summit Daniels Canyon, 8000 ft., July

1926 (Brown).
California: Stanford University, Palo Alto (Tanner).

31. Sides of second abdominal segment furnished with black pile ..... 32
Sides of this segment destitute of black pile ..... **morio seminigra** (Lw.)
Distribution: Utah, published records: Cache Co., Logan, July 1925 (Hall); Davis Co., Bountiful, July 1929 (Pack); Salt Lake Co., Salt Lake City, July 1929 (Knowlton).
New Records: Cache Co., Wellsville, July 15 (King); Weber Co., Riverdale, Weber River, June 1926 (Hayward); Utah Co., Aspen Grove (Tanner, Johnson), Rock Canyon (Tanner); Iron Co., Miners Peak, July 9, 1919; Washington Co., Zion National Park (Tanner).

32. Knob of halters largely yellow; brown in cell 1M-2 reaches beyond the r-m cross-vein ..... **morio morio** (L.)
Distribution: Utah, new records: Cache Co., Logan Canyon, Tony's Ranger Station, June 1926 (Hayward), Logan (Hall), Wellsville Canyon, June 1925 (Tanner); Boxelder Co., Raft River Mts., 10,000 ft., June 1926 (Tanner); Duchesne Co., Ft. Duchesne, June 1930 (R. L. Janes); Utah Co., Aspen Grove (Tanner), Rock Canyon (Tanner); Sanpete Co., Indianola (Tanner); Juab Co., Dividend (Spalding); Iron Co., Miners Peak, July 11, 1919; San Juan Co., La Sal Mts., Mt. Tukuhnikivatz (Tanner), Ute Mt., Utah-Colorado line (Tanner); Wayne Co., Hanksville (Stanton); Garfield Co., Bryce Canyon (Tanner).
Colorado: Ft. Valley School, 6000 ft., August 1932 (Jeppson).
Knob of halters wholly blackish; brown in cell 1M-2 does not pass beyond this cross-vein ..... **catulina** (Coq.)
Distribution: Refer to 27.

33. Brown of wings extending to base of cell R-4 ..... 35
Brown of wings does not reach cell R-4 and only partly fills cell 1M-2; face yellowish red shading to yellow below, with black pile and yellowish tomentum ..... 34

34. Abdomen with no black pile; scutellum with heart-

shaped red spot on dorsum, bristles light yellow; tomentum light greyish yellow on thorax, greyish yellow and black on abdomen ..... ..... **utahensis** n. sp.

Abdomen with black pile mixed with white on all segments except first; scutellum red except base, bristles of posterior edge reddish; tomentum of dorsum bronze and white on thorax, with added bands of black on abdomen..**macula** (Cole)

Distribution: Utah, new record: Utah Co., Provo (Brown).

35. Reddish brown of wings fills cell 1M-2 to edge of wings at end of vein M-3+4+Cu-1; pile largely reddish golden, except on segments four and five of abdomen, which is black; scutellum red except front third, with red and black bristles; face and lower front reddish with red tomentum and black pile ..... **vanduzeei** (Cole)

Distribution: Utah, new record: Wayne Co., Hanksville (Stanton).

Cell 1M-2 hyaline in apex along the medial cross-vein; hyaline spots on r-m and base of medial cross-veins, and base of R-2+3 and Cu-1; greyish brown of wings not reaching edge of wing at any point; pile largely white except on segments five to seven of abdomen which have sparse black pile; scutellum with red bristles; face yellow, with yellow pile and tomentum .... ..... **nugator** (Coq.)

Distribution: Colorado: Mesa Verde National Park (Tanner).

**Villa** species.

Unidentified and rubbed specimens of which there are five species as new records.

**Distribution:** Utah, published records: Boxelder Co., Cedar Springs, August 1929 (Knowlton), Corinne, July 1929 (Knowlton), Promontory, July 1929 (Knowlton).

New records: One species, Boxelder Co., Promontory, August 1929 (Knowlton); one species, Utah Co., Provo (J. A. Rowe); one species, Garfield Co., Bryce Canyon (Tanner); two species Washington Co., Zion National Park (Tanner).

**Villa utahensis** n. sp.

Male, length 9-9½ mm. Female, 10-10½ mm.

Face protruding (Fig. 47), light yellow below shad-

ing into a reddish-yellow on lower front, and black above. First two antennal joints yellow with black pile, third joint black, conical (Fig. 46). Pile of face yellow with very scant black pile along medial line, tomentum yellow, dense. Pile of front black, tomentum yellow, both sparse. Tomentum of occiput white. Proboscis not or scarcely projecting.

Pile of thorax in front of wings a buff-yellow, pile and light tomentum of dorsal of rest of thorax and all of abdomen a light grayish-yellow. Pile and tomentum on venter of thorax and on coxae white. Thoracic and scutellar bristles light yellow. Scutellum with a heart-shaped red spot above. Abdomen with red spot laterally on segments two and three and lateral margins of the terga reddish-yellow; a band of same across apex of seventh tergite and each sternite (the third and fourth may be entirely yellow). Segments 2 to 4 with light tomentum across base and metallic black tomentum across apex of the terga, the bands meeting medially on each segment. Some black tomentum on bases of remaining terga. All pile and tomentum of venter light except band of black tomentum on base of segments 5 to 7.

The genitalia of the female (Figs. 49-50) have been studied and the parts homologized with those of other families and orders. The chief distinctive characteristics of this species lie in the sclerotization of segment 8, and in the spines, which are five in number and of uneven lengths. The male genitalia are illustrated in Figs. 51-52.

Prothoracic legs with femora mostly black except for red narrowly on basal and apical portions, tibiae light red shading to black just beyond middle, and tarsi black. Other legs with red femora and tibiae, and tarsi dark shading to black. Tomentum of legs light yellowish white, bristles black. Front tibiae free of bristles, and with minute claws. Other claws large.

Wing color a tannish-brown, extending from apex to subcosta on a line with apex of the medial cross-vein to M-2+3, cell 1st M-2 sub hyaline to opaque except along veins; color extends across basal third of 2nd. M-2 and Cu-1, and into cells 1A and 2A along the second anal vein. Hyaline spots on all veins going cross-wise of wing below the radial vein. See Fig. 42.

Wings very similar to **V. macula** (Cole) but differs in other characters: e. g.: **V. macula** has black pile on abdominal segments, scutellum broadly red, bristles of it and thorax red, and tomentum partly bronze colored.

Larger species, 12 mm.

Type: Male, No. 32, Brigham Young University Collection; collected at Provo, Utah, by Truman Swallow.

Allotype: Female, in the collection of R. H. Painter, collected at Provo, Utah, by Truman Swallow.

Paratypes: Two males and two females collected at Provo, Utah, April 29, 1934, by D. Elmer Johnson; one male and one female (slightly rubbed), collected at the same locality by Lee Jeppson.

In addition Dr. Painter has one badly rubbed specimen from Uvalde, Texas, and the Utah State Agricultural College has a rubbed specimen (female) from Bothwell, Utah, June 2, 1931 (Knowlton).

**Poecilanthrax** Osten Sacken 1901

This genus is very similar to the genus **Villa** Lioy, and the wing venation and antennae of the two genera are almost identical, and for that reason, are not figured for this genus. The antennae have the third joint in shape of an irregular cone tapering to a long point. There is little pile and little or no tomentum on the face and front, and the indentation on the posterior margin of the eye is very short here. The scutellum in all the species noted is red.

**Table of Species**

1. Apex of wings beyond base of cell R-4 distinctly hyaline and brown ..... 2

   Apex of wings beyond base of cell R-4 either wholly hyaline, wholly gray or wholly brown; proboscis projecting not more than the length of its labellae beyond the oral margin; cell 1A, or at least cell 2A partly hyaline; veins at bases of cells R-5 and Cu-1 never bordered with subhyaline; venter wholly black ..... 11

2. Pile of abdomen black and white or very light yellow tufted; wing color dark blackish brown .... ..... **californica** Cole

   Distribution: Utah, new record: Washington Co., St. George (A. M. Woodbury).

   Light pile darker yellowish to brownish; wing color reddish brown ..... .... 3

3. Cell 2M-2 divided into two cells by a cross-vein; a stump of a vein usually projects into the distal M-2 cell (3M-2) from the medial cross-vein .... ..... **halcyon** (Say)

   Distribution: Utah, published record: Amalga,

August 1927 (Knowlton).
New records: Utah Co., Rock Canyon (Jeppson), Provo (Johnson); Washington Co., Zion National Park, August 1932 (Johnson).
Colorado: Ft. Valley School, 6000 ft., August 1932 (Tanner); Trinidad, Stonewall, 8500 ft., August 1925 (C. J. Drake).
Note: Occiput black, second joint of antennae partly or wholly black, but specimens from Zion National Park show all but vertex of occiput next to eye yellow, and second joint of antennae yellow. Occasionally one or both wings may lack the cross-vein in 2M-2 (see 10).

Cell 2M-2 never divided into two cells by a cross-vein 4

4. A hyaline spot usually contained in each of the following cells, R-1, R-3, M-1, and 2M-2 ..... 5
The above cells wholly brown; great variation in size ..... **effrena** (Coq.)
Distribution: Utah, new records: Salt Lake Co., Salt Lake City; Garfield Co., Bryce Canyon, August 27, 1932 (Tanner); Washington Co., Zion National Park (Tanner, A. M. Woodbury, Lowell Woodbury), St. George (Tanner), Santa Clara (Tanner).

5. Basal fourth of cell 2A brown ..... 6
Basal fourth of cell 2A hyaline, this usually extending into cell 1A; a portion of vein R-4, and the medial cross-vein not bordered with brown ..... ..... **poecilogaster** O. S.
Distribution: Colorado, Mesa Verde Nat. Park (Tanner).
Note: Both the specimens at hand have a cross-vein in cell 2M-2 as in **halcyon,** but the species is much smaller and the sides broadly red.

6. Posterior edge of cell 2A wholly brown ..... 7
Posterior edge of cell 2A largely hyaline; the base, front edge, and apex of this cell being brown .... ..... **willistonii** (Coq.)
Distribution: Utah, published records: Cache Co., Trenton, August 1927 (Knowlton); Weber Co., Roy, Sept. 1927 (Knowlton); Sanpete Co., Mt. Pleasant, Sept. 1929 (Pack); Amalga, August 1927 (Knowlton).
New records: Duchesne Co., Ft. Duchesne, Aug. 24, 1932 (Knowlton); Salt Lake Co., Salt Lake City (T. R. Chamberlin); Utah Co., Rock

Canyon, Provo (Stanton, Hayward, Maughan, Gloria Tanner, Johnson, Brown), Spanish Fork (Hardy); Millard Co., Fillmore (Swallow), Sand Dunes North of Lynndyl, Sept. 1926 (Tanner); Sevier Co., Richfield (Rowe), Fish Lake; Beaver Co., Beaver (Tanner); Garfield Co., Bryce Canyon (Tanner), Widtsoe (Tanner); Iron Co., Parowan (Tanner); Washington Co., St. George (A. M. Woodbury, Lowell Woodbury, Tanner), Zion National Park (Tanner, A. M. Woodbury).

7. Abdomen broadly red at sides, or with well defined red spots on sides of at least segments 2 and 3 .... 8
Abdomen with small, indistinct red spots on sides of segments 2 and 3 ..... **flaviceps** (Loew)
Distribution: Utah, new record: Garfield Co., Widtsoe (Gloria Tanner).

8. Cell R-4 bisected by a cross-vein; thoracic bristles black and red ..... species, near **alpha** O. S.
Distribution: Utah, new record: Washington Co., Zion National Park (Tanner).
Cell R-4 not bisected, thoracic bristles yellow ..... 9

9. Legs with abundant black tomentum, coxae greyish black; wing color blackish brown ..... ..... **signatipennis** (Cole)
Distribution: Determination on this species only tentative.
Idaho, Island Park (Tanner).
Wyoming, Yellowstone National Park (Tanner).
California, San Pedro (Beck).
Legs with all yellow tomentum ..... ..... 10

10. Occiput black; venter of thorax blackish or greyish ..... **halcyon** (Say)
Distribution: See statement 3.
Occiput partly yellow; venter of thorax yellow .... ..... **signatipennis** (Cole)
Distribution: Utah, new record: Utah Co., Provo (Johnson).
Wyoming, Farson, Big Sandy Creek (Beck).

11. Light pile yellowish or buffy ..... 12
Pile black and white, wings blackish smoky, hyaline parts slightly dark ..... **species dubius**
Distribution: Utah, new record: Garfield Co., Widtsoe (Tanner).

12. Legs red; little if any black pile on second abdominal segment, and no heavy tufts of black on any segment ..... 13

Legs mostly black, prominent tuft of black pile on sides of abdominal segments, except 1 ..... ..... **painteri** n. sp.

13. Brown of wings fills wing but is somewhat lighter at apex and along hind margin, some black pile on abdomen ..... **tegminipennis** (Say)

Distribution: Utah: Utah Co., Provo (Hatton, Johnson).

Colorado: Pikes' Peak 9500 ft., August, 1932 (Tanner); Estes Park, 7000 ft., August 1932 (Tanner).

Apex and hind margin of wing broadly nearly pure hyaline; no black pile on abdomen ..... ..... **tegminipennis sackenii** (Coq.)

Distribution: Utah, new records: Boxelder Co., Promontory, Sept. 1930 (Janes); Utah Co., Provo (Stanton); Juab Co., Dividend (T. Spalding).

Colorado: Buena Vista, 7800 ft., August 1932 (Jeppson), Pikes Peak, 9500 ft., August 1932 (Tanner).

**Poecilanthrax painteri** n. sp.

Female: length 14-15 mm.

Black species except for face, lower front, and first antennal joint, which are yellow, scutellum red dorsally, first abdominal sternite reddish yellow, and some dark reddish-black on legs.

Face moderately produced, with scant yellow pile at sides and black pile above epistoma, proboscis scarcely projecting; front and first antennal joint with sparse black pile. A tongue of black color extends into the yellow of the front near the vertex (Fig. 58). Occiput with scant fine yellow tomentum.

Pile of front of thorax buffy, of rest of thorax yellowish, with very scattered short black pile on dorsum. Tomentum of thorax yellow with a slightly golden tint, except for a patch of black on the scutellum, half on the red and half on the black of it, and about half as wide as the scutellum. Bristles yellow. Venter of thorax yellowish pilose.

Abdomen heavily yellow pilose at sides, with a large tuft of black in the yellow at apex of each segment at

sides, on segments 2-6. Apex of segment 7 moderately heavily black pilose with some yellow. Dorsally a triangle of black tomentum with its base to apex of the segment, is found on segments 2-5; the triangle is nearly as wide as segment on 2, about one-fifth as wide as segment on 3, and successively narrower on 4 and 5. Rest of tomentum yellow. Pile of dorsum is all scant, yellow in yellow bands of tomentum, black in black bands and across apex of each segment. Venter yellow pilose and tomentose, with a very little black pile on apex of segments 5 and 6, and considerable mixed with the yellow on apex of 7.

Legs black except tibiae and apices of femora of mesothoracic and metathoracic legs dark reddish black. Tomentum metalic tan, appearing reddish in some lights, and almost black in others.

Wings with costal and subcostal cells light brownish, and all the veins very narrowly bordered with brown. Hyaline of cells slightly darkened with brown.

Only females of this species have been collected.

This species is most closely related to **P. californica** Cole, which has wings definitely mottled brownish and hyaline; line between black and yellow of vertex of head gently curved; and all legs partly yellow, and with black tomentum. Species near it in key are separated by having legs red, and only scant black pile at sides of abdomen.

This species is named in honor of Dr. Reginald H. Painter, who has kindly determined all of the specimens used in writing this paper, and who furnished the type and paratype specimens of this species.

Type: No. 30, Brigham Young University Collection, taken at Dividend, Juab Co., June 6, by Tom Spalding.

Paratype: One female, in the collection of Reginald H. Painter, taken at Eureka, Juab Co., June 14, 1920, by Tom Spalding.

**Bombylius** Linne 1761

The genus **Bombylius** L. has the Rs branching before the r-m cross-vein at an acute angle. There are three branches present in the medial vein, and cell R-5 is closed some distance from the edge of the wing. Cell R is longer than M. and the anal cell is open (Fig. 34). The face is short, and the proboscis long, projecting from one-half to as long as the entire body. The third joint of the antennae is broad and slightly tapered at the point, as

long as or longer than the first two (Fig. 13). Eyes of males holoptic, and of females dichoptic.

**Table of Species**

1. Outline of brown on wings indistinct or spotted ..... 2
   Outline of brown distinct, extending from apex of cell R-1 basally to apex of vein R-1, across to apical third of cell 1M-2, basally along vein M-1+2 to medial cross-vein, then across to branching of Cu and basally to the outer margin of the axillary incision; pile a light yellowish gray to dark golden brown, with tufts of blackish brown on sides and venter of segment three and scattered black pile on dorsum of segments 2-7; legs red shading to black on last segments of tarsi ..... **major** Linne

   Distribution: Utah, published records: Cache Co., Logan, (L. Davidson, Thomas); Washington Co., St. George, July 1925 (Hall).

   New records: Rich Co., Bear Lake Valley, West Side (Hayward); Boxelder Co., Tremonton, July 1928 (Beck); Salt Lake Co., Parley Canyon, May 2, 1909 (Titus); Utah Co., Provo (Rowe, Johnson, Cottam, Hasler, Hayward); Juab Co., Dividend (Spalding); Washington Co., Pine Valley (Liddle).

   California: Stanford University, Palo Alto (Tanner).

2. Wings spotted with black ..... 3
   Wings not spotted, outline of color indistinct ..... 4

3. Wings clouded at base and front, 6 or 7 spots of color in hyaline part, r-m cross-vein located just beyond the middle of vein M-1+2; pile dull greyish, sometimes somewhat reddish, mixed with scant black pile on dorsal of abdomen ..... **albicapillus** Loew

   Distribution: Utah, published records: Cache Co., Blacksmith Fork Canyon, May 1927 (Knowlton), Cache Junction, June 1929 (Hagan); Salt Lake Co., Emigration Canyon, June 1925, (Hall).

   New records: Utah Co., Provo (Sutherland, Swallow, Rowe, Hayward, Thomas, Jeppson, Maughan, Johnson, Cottam, Beck), Utah Lake East Side (Clarence Cottam), Spanish Fork (Hardy).

Idaho: Moscow (Sudweeks).

Wings distinctly hyaline and brown, not clouded; spots of brown on apex of most veins, with subhyaline borders on the veins within the spots; irregular row of spots across wing from apex of R-2+3 to apex of cell M-1, and from apex of vein R-1 to apex of M-3+Cu-1; basal fourth of front of wing solid brown; r-m cross-vein less than its length from the forking of M-1+2; pile of thorax mixed white, golden, and black, of abdomen golden and black; ground color of body velvety black ..... **pulchellus** Lw.

Distribution: Iowa, Ames (Beck).

4. Face with at least outer half red, pile of front black 5
Face entirely black, pile of front lighter colors, male with silvery pile above the antennae ..... 6

5. Wing color a decided reddish brown, halteres yellowish red; pile of body a greyish white or yellowish brown with no black; face moderately clothed with black pile ..... species which may be either **fascialis** Cress. or **clio** Williston

Distribution: Utah, new record: Utah Co., Spanish Fork (Hardy).
Colorado: Mesa Verde National Park, June 1927 (Tanner).

Wing color smoky may be somewhat brownish; halteres brownish black, may have yellow knobs; pile grey to slightly yellowish, with black in tufts on sides of segments 2 and 3, and scattered on other segments; face lightly cloth-ed with black pile ..... **lancifer** O. S.

Distribution: Utah, published records: Salt Lake Co., Salt Lake City, Sept. 1927 (Knowlton), City Creek Canyon, July 1925 (Hall).

New records: Rich Co., Bear Lake Valley, West Side (Hayward); Cache Co., Logan Canyon, Tony's Ranger Station, June 1926 (Hayward, Tanner, Brown); Wasatch Co., Summit Daniels Canyon, 8000 Ft. July 1926 (Brown); Utah Co., Aspen Grove (Tanner, Hayward), Spanish Fork (Hill); San Juan Co., LaSal Mts., Mt. Tukuhnikivatz (Tanner); Washington Co., Zion National Park, (Tan-

ner, Liddle, A. M. Woodbury).

Idaho: Island Park (Tanner); Warm River (Tanner); Mink Creek (Hall).

New Mexico: Jemez Springs, August 1914 (J. Westgate).

6. Legs black ..... 7
Legs red, tarsi black or reddish black ..... 8

7. Pile above antennae of female golden ..... **aurifer** O. S.

Distribution: Utah new record: Cache Co., Logan Canyon, Tony's Ranger Station, June 1926 (Brown).

Pile above antennae of female silvery. Black pile on segments 2 and 3, rest of body pile a yellowish gray, some may be slightly darker ..... ..... **aurifer aurifer** O. S.

Distribution: Utah, new records: Rich Co., Bear Lake Valley (Hayward); Cache Co., Logan Canyon, Tony's Ranger Station, 8000 ft., (Brown); Utah Co., Provo (Tanner), Aspen Grove (Tanner, Hayward).

8. Pile above antennae of female golden brown, general color of pile is a golden brown, though it is grayish in some specimens .. **aurifer pendens** Cole

Distribution: Utah, new record: Summit Co., Uintah Mts., Tryol Lake (Tanner).

Pile at sides of antennae of female silvery white, black tuft of pile in front of wing on the thorax, abdomen with considerable black pile ..... ..... **metopium** O. S.

Distribution: Utah, new records: Utah Co., Provo (Rowe, Beck, Johnson, Cottam).

### **Heterostylum** Macquart 1848

The genus **Heterostylum** Macq. is characterized by Painter (1930 b) as follows:

"Head as broad as thorax; eyes emarginate posteriorly; proboscis nearly equaling the length of the body; antennae approximate at base, first joint longer than broad, third lanceolate with a short two-jointed style, (Fig. 24); palpi two jointed; scutellum swollen, semicircular; abdomen as large as or smaller than the thorax; pulvilli present; wings and venation as in Bombylius; vein between first M-sub 2 and M-sub 1 small or punctiform." (Fig. 33)

**Heterostylum robustum** (O. S.)

This description is based on that of Osten Sacken (quoted by Painter). Head grayish white to yellow around mouth, with pale yellowish pile, and some black on ocellar tubercle. Thorax and abdomen a grayish black, scutellum red except at base. Legs red shading to brownish red on tarsi; posterior tibiae and tarsi brown. Pile of thorax light buff, with yellow bristles; those of scutellum black. Pile of abdomen yellowish white and brownish black which varies in amount. On the specimens at hand it forms a band across posterior margin of segment 2, on lateral and ventral of 3, and lateral of 5 and 6. Pile of venter is whitish with added blackish on posterior segments. Some yellowish white tomentum on dorsal of abdomen particularly on segment 2. Wings grayish hyaline.

Distribution: Utah new record: Cache County, Logan, July 1930 (Knowlton and Janes).

California, Harbor City, San Pedro (Beck).

**Anastochus** Osten Sacken 1887

The genus **Anastoechus** O. S. has a wing somewhat resembling that of the **Bombylius,** excepting that the r-m cross-vein is situated near the base of cell 1M-2, making cells R and M of practically equal length. The proboscis is elongated similarly to that in the latter genus. The face is rounded and densely pilose. Eyes of males separated by a little more than the width of the ocellar triangle, eyes of female on sides of the head, separated by about five times the width of the ocellar triangle. Antennae as shown in Fig. 12. The claws are well developed, and pulvilli are present. Length measured includes pile.

**Table of Species**

Length, except rarely, 10 mm. or less, more slender species; pile mostly grayish, mixed on abdomen with pile that is light at base and darker toward distal end, giving an effect of light buff-gray to abdominal pile; half or more of wings brownish smoky ..... **barbatus** O. S.

One specimen is a deep orange, and 11 mm. in length.

Distribution: Utah, published records: Cache Co., Cache Junction, March 1925 (Hagen).

New records: Rich Co., Bear Lake Valley (Hayward); Cache Co., Logan, July 1926 (Hayward), Providence Sept. 5, 1931 (Janes), Sardine Can-

yon, Sept. 16, 1931 (Knowlton); Box Elder Co., Garland, Sept. 13 1930, on Russian Thistle (Knowlton); Weber Co., Far West (Brown), Roy, Sept. 1927 (Knowlton); Salt Lake Co., Salt Lake City, August 1915 (P. B. Miles); Utah Co., Provo (Gloria Tanner, Maughan, Hayward, Brown, Johnson); Sevier Co., Richfield, Sept. 1930 (Rowe); Washington Co., St. George (A. M. Woodbury).

Length 11 mm. or more, robust species; ground color of pile more yellowish to orangish-gray heavily mixed on abdomen with light-dark pile as above, the total effect being brownish, but variable; wings, except sometimes costal cell hyaline ..... ..... **melanohalteralis** Tucker

One specimen is a dark burnt orange on thorax and fore part of abdomen, and brownish on last 2 segments.

Distribution: Colorado. All collected in August 1932, Pingree Park (Jeppson, Tanner); Buena Vista, 7800 feet (Jeppson); Pikes Peak, 9500 feet (Tanner, Jeppson); Fountain Valley School, 6000 feet (Tanner); Trinidad, Stonewall, 9000 feet, August 1925, (C. J. Drake).

### **Systoechus** Loew 1855

The wing venation of **Systoechus** Loew is almost identical with that of **Anastoechus** O. S. A study of a greater number of species might show this to be incorrect, but in **S. oreas** the free part of M-2 before the medial cross-vein is one-half to two-thirds the length of the free part of Cu-1, and M-1+2 has a decided curve before its branching (Fig. 8), while in **A. barbatus** O. S., the free part of M-2 is as long as or longer than Cu-1, and M-1+2 is only slightly curved. **Systoechus** has the face protruded and only moderately to lightly clothed with pile. Eyes of the male touch ocellar triangle and almost meet in front of it, eyes of female are separated about three times the width of the triangle. The antennae are as in Fig. 11. The claws are well developed, and pulvilli are present.

This genus is represented in Utah by two species or subspecies. There is some doubt as to the specific distinctness of these two, and in the material at hand there are many intergrading forms between them. They are separated as follows:

1. Scutellum more or less red ..... **vulgaris** Loew

Distribution: **S. vulgaris** Lw. is reported from Utah by Osten Sacken (Aldrich, 1904). No locality records given. New records: Rich Co., Bear Lake Valley (Hayward); Boxelder Co., Cornish, July 1930 (Knowlton), Promontory, August 1930 (Knowlton), Blue Creek (Knowlton and Janes); Cache Co., Logan, August 1931 (Thomas), Providence, June 1 (Janes), Wellsville Canyon, June 1926 (Cottam, Brown), Dry Lake, 1926 (Knowlton); Weber Co., Wanship, Weber River (Beck, Tanner), Riverdale, Aug. 3 (Knowlton and Janes); Duchesne Co., Ft. Duchesne, July 25, 1932 (Stoffers, Cutler); Salt Lake Co., Salt Lake City, August 1930 (T. R. Chamberlin); Utah Co., Provo (Stanton, Johnson), Spanish Fork (Hardy, Beck); Millard Co., Fillmore, Hinkley, July 30, 1914 (Jones).

Wyoming: Jenny Lake, Grand Teton National Park (Tanner).

Colorado: Ft. Valley School, 6,000 ft., August 1932 (Tanner, Hayward, Peppson); Loveland, 4982 ft., August 1932 (Hayward).

2. Scutellum entirely black ..... **oreas** O. S.

Distribution: Utah, published records: Cache Co., Dry Lake, July 1923 and 1926 (Knowlton), Hyrum, July 1927 (Knowlton); Blue Creek, July 1929 (Knowlton); Howell, Sept. 1930 (Knowlton).

New records: Cache Co., Logan Canyon, Tony's Ranger Station, June 1926 (Hayward), Logan, June (Hayward, Thomas), Wellsville Canyon, June 1926 (Hayward, Brown, Cottam), Providence, 1931 (Hammond); Boxelder Co., Blue Spring Hill, June 1928 (Tanner); Weber Co., Wanship, Weber River (Beck); Summit Co., Uintah Mts., Tryol Lake (Tanner, Hayward, Fechser), June 1926 (Swallow), Mirror Lake; Utah Co., Mt. Timpanogas, August 1925 (J. W. Harrison); Sanpete Co., Indianola (Tanner).

Idaho: Paris (Hayward); Lava Hot Springs, June 1929 (Maughan)—the most typical specimen.

**Conophorus** Meigen 1803

This genus is outstandingly characterized by the fact that the first joint of the antennae is very greatly swollen

(Fig. 20). The wings have the Rs branched far before the r-m cross-vein, media with three branches, and cell R-5 open to the margin of the wing.

A sectoral cross-vein is usually present (Fig. 32), though it seems to be variable, and in one specimen at hand is present in one wing and not in the other. The proboscis projects beyond the oral margin, but is never longer than to the ends of the antennae, and then has large and rather fleshy labellae. The face is very short above, and the cheeks broad and rounded; the head as a whole is flattened and broad. The eyes of the male are holoptic and of the female dichoptic. As in the preceding genus, the tarsal claws are well developed, and the pulvilli present.

In Utah four species of **Conophorus** are found, though the distribution is mostly rather restricted in the specimens at hand.

**Table of Species**

1. Wings hyaline; abdomen wholly opaque ..... 2
   Wings hyaline; abdomen partly shining ..... 3
2. Scutellum wholly opaque; pile of antennae and face largely black; wings blackish in front; pile of thorax and scutellum largely yellowish; costa destitute of tooth-like projections....**melanocerata** Bigot
   Distribution: Utah, new records: Cache Co., Logan Canyon, Tony's Ranger Station, June 1926 (Tanner); Iron Co., Miners Peak, July 12, 1919; San Juan Co., Bears Ears, Elk Ridge (Tanner).

   Scutellum shining; knobs of halteres brown; shorter, thick-set species ..... **atradula** Loew
   Distribution: Utah, new records; Boxelder Co., Corinne, May 8, 1931 (Knowlton), Blue Creek, May 31, 1932 (Knowlton), Willard, April 26, 1931 (Knowlton); Utah Co., Aspen Grove (Tanner).
3. Abdomen except first segment, wholly shining greenish blue, halteres black; dorsal pile gray; lateral pile of segments 2 to 7, ventral pile, and that of head, black ..... **amabilis** (O. S.)
   Distribution: Utah, new record: Juab Co., Dividend (Spalding).

   Idaho: Oakley, June 1926 (Beck).

   Abdomen having each segment partly opaque; knob of halteres partly or wholly yellow; pile of thorax

and abdomen mixed black and yellowish ..... ..... **nigripennis** (Loew)

Distribution: Utah, new records: Washington Co., Zion National Park (Tanner, A. M. Woodbury).

**Lordotus** Loew 1863

Antennae long, first joint normal (Fig. 18). Body cone shaped with abdomen tapering. The sectoral crossvein is present, other venation as in the preceding genus (Fig. 35), and the scutellum is convex. The proboscis projects far beyond the oral margin. Males holoptic, females dichoptic. Two species are represented from Utah, and they are separated as follows:

1. Second antennal joint nearly twice as long as broad; costa of male beset with tooth-like processes; pile of face and breast wholly white or yellowish; wings with cell R and base of cell R-1 yellowish; femora partly black; very variable as to size and coloration ..... **gibbus** Loew

   Distribution: Utah published records: Cache Co., Logan, August 1930 (Knowlton), Richmond, July 1929, (Knowlton); Boxelder Co., Amalga, August 1927 (Knowlton).

   New records: Cache Co., Logan (I. N. Hayward, C. Lynn Hayward); Boxelder Co., Promontory, September 1930 (Janes); Salt Lake Co., Salt Lake City, September 1913 (P. B. Miles); Utah Co., Provo (C. Lynn Hayward, Johnson); Sevier Co., Clear Creek Canyon (Rowe); Richfield, September 1930 (Rowe); Garfield Co., Bryce Canyon (Tanner); Washington Co., St. George (L. A. Woodbury).

   Colorado: Ft. Valley School, 6000 ft., August 1932 (Hayward, Jeppson).

2. Second antennal joint scarcely longer than wide; wings except in the costal cell wholly hyaline; pile of face, antennae, breast and venter largely black; costa of male destitute of tooth-like processes ..... ..... **apicula** Coq.

   Distribution: Utah, published record: Tooele Co., Vernon (Knowlton).

   New record: Washington Co., Washington (Tanner).

**Neacreotrichus** Cockerell 1917

The wing of this genus is almost identical with that of **Phthiria** Meigen (Fig. 31), so has not been figured. Both genera have the humeral cross-vein located just beyond the middle of cell 1M-2. The antennae are similar as to size, but the third joint of **Neacreotrichus** Cockerell is almost club-shaped (Fig. 56), while in **Phthiria** it is more oval, (Fig. 57). The face and antennae are long pilose, while in **Phthiria** they are bare or short pilose.

Only one species has been collected.

**Neacreotrichus simulis** (Coq.)

Described as **Phthiria gracilis.** Specimens are somewhat rubbed, so no characterization will be attempted.

Distribution: Utah, new record: Boxelder Co., Kelton, Sept. 13, 1930 (Knowlton).

**Phthiria** Meigen 1820

In the genus **Phthiria** Meigen the Rs branches before the r-m cross-vein at an acute angle, the Rs and medial veins each have three branches, and cell 1A is closed (Fig. 31). The proboscis is long; third joint of antennae without or with short bristly hairs above. First two joints sub-equal in length, the third long and somewhat enlarged (Fig. 16). Small species.

Utah is the type locality for P. **quinquenotata** John. (Aldrich, 1904), but the writer has not seen this species.

**Table of Species**

1. Wings, except sometimes in the costal cell hyaline .... 2
   Wings marked with brown clouds or spots, about six in number on each; body not marked with black; cheeks wholly light yellow ..... **sulphurea** Loew
   Distribution: Utah, published record: Boxelder Co., Snowville, August 1929 (Knowlton).
   New records: Cache Co., Dry Lake July 5, 1929 (Knowlton); Boxelder Co., Blue Creek, Aug. 23, 1931 (Knowlton); Garland, Aug. 22, 1931, on russian thistle (Knowlton); Tooele Co., Lake Point, Sept. 11, 1929 (Knowlton); Utah Co., Provo (Johnson).
2. Body more or less black ..... 3
   Body wholly yellow, only the proboscis and tips of tarsi black ..... **sulphurea** Loew
3. Head, thorax, and sometimes the abdomen marked with yellow (females), antennae black, sides of

face not spotted ..... 4

Head, thorax and abdomen wholly black, thorax and scutellum opaque; pile of head and body whitish (males) ..... **humilis** O. S.

Distribution: Utah, new record: Male, Tooele Co., Copper Mts., Tacoma Range, June 1928 (Tanner).

4. Scutellum and dorsum of thorax wholly black ..... ..... **florale** Coq.

Distribution: Utah, new record: Tooele Co., Copper Mts., Tacoma Range, June 1928 (Tanner).

Scutellum partly yellow; sides of scutellum and of face largely black (females) ..... **humilis** O. S.

### **Sparnopolius** Loew 1855

The general characteristics of the genus **Sparnopolius** Lw. are as follows: The Rs forks before the R-m cross-vein at an acute angle, cell R-4 is very short, cell R-5 open, anal cell open, and cells R and 2M are of nearly equal length (Fig. 30). The first antennal joint is slightly swollen (Fig. 17); proboscis projecting.

**Sparnopolius coloradensis** Grote

Pile and tomentum of body and front entirely a deep yellowish orange, tomentum hair-like. Dorsum is velvet black, venter and sides of thorax grey with very little pile, legs dark reddish brown to black on tarsi; femora and tibiae with dense yellowish tomentum. Face red, overlaid with grey, and with sparse yellow pile. Antennae with black pile. Proboscis projects two-thirds its length beyond the epistoma. Length, 5 mm.

Distribution: Utah, new record: Utah Co., Aspen Grove, 7000 ft. (Tanner).

### **Eclimus** Loew 1884

The wing in this genus (Fig. 29) has the general venation as given above, except that cell R-4 is rather long, and cell R is considerably longer than M. The r-m cross-vein is very short, and the wing is almost rectangular rather than rounded and pointed at apex. The third antennal joint is but little longer than the first, the mesonotum of male sometimes muricate, and the costa dentate; the eyes of the male are very narrowly separated between vertex and antennae. Three males representing 3 species are in the collection at the Brigham Young University.

**Table of Species**

1. Labial palpi more than half as long as proboscis; pile on venter of thorax whitish; costa not denticulate; scutellum small, highest part considerably lower than level of mesonotum; wings blackish clouded on anterior third; length 9 mm. ..... **laniger** Cress.

   Distribution Utah: Utah Co., Springville, May, (Hayward).

   Labial palpi half as long as proboscis or less; black pile on venter of thorax; scutellum large, swollen, highest part on a level with mesonotum ..... 2

2. Pile of dorsum entirely whitish except on segments 6 and 8 of abdomen, where it is entirely black; labial palpi less than half as long as proboscis; cells C and Sc black, R heavily clouded and R-1 and R-3 lightly so with blackish brown which also extends across R-3 heavily to the r-m cross-vein and surrounds that vein; rest of wing hyaline. Wing length 12½ mm. Body length 13½ mm. ..... **Eclimus** species

   Distribution: Utah-Idaho line, Deep Lakes, Bear River Mts. (Hayward).

   Female, belongs to a group of species described only from the males. It is impossible to tell to which this belongs.

   Pile black and very scant white on thorax and head, white on abdomen, except black on segments 5-8; labial palpi ½ as long as proboscis; wings with apical half and cell R smoky, and C and Sc black, and a smoky tinge along all veins in hyaline except 2A. Wing length 15 mm., body length 16-17 mm. ..... **ostensackenii** Burgess

   Distribution: Utah Co., Provo, July 1912 (Spalding).

**Aphoebantus** Loew 1872

This genus has a wing venation almost identical with that of **Villa** except that the Rs forks at an acute angle before the r-m cross-vein (Fig. 40). The third antennal joint more than twice the length of the first, bulbous at base (Fig. 21). Face retreating in profile. Slender, somewhat conical species with rather large heads.

Four species are represented definitely in the state, it being the type locality of **A. mus** O. S. (Aldrich 1904),

and four others have been collected, but are so poorly preserved that they cannot be identified.

**Table of Species**

1. Abdomen furnished with black scales ..... 2
   Abdomen destitute of black scales, pile of front black, knob of halteres yellow, scales of abdomen brown; hind margin of scutellum opaque ..... **cervinus** Loew

   Distribution: Utah, new records: Wayne Co., Hanksville (Stanton); Garfield Co., Bryce Canyon (Tanner); Washington Co., Zion National Park (Tanner).

2. Knob of halteres largely or wholly light yellow ..... 3
   Knob of halteres dark brown, styliform portion of third antennal joint twice as long as the thickened basal part; cross-bands of black scales on abdomen of female not interrupted in the middle..**mus** (O. S.)

   Distribution: Published record: Salt Lake Co., near Salt Lake, Aug. 1 (Osten Sacken). (From original description in Western Diptera p. 247.)

3. Styliform portion of third antennal joint scarcely longer than thickened basal part; pile of front white; spots of black scales on abdomen in two rows ..... **vulpecula** Coq.

   Distribution: Utah, new record: Washington Co., St. George, May 2, 1919. (Tanner).

   Styliform portion twice as long as thickened basal part; pile of front black; cross-bands of black scales on abdomen of female more than four times as broad as those of light colored scales ..... **carbonarius** (O. S.)

   Distribution: Utah, new record: Washington Co., St. George, May 27, 1919. (Tanner).

**Aphoebantus** species.

Four distinct species too rubbed to identify.

Distribution: Utah records: 1 species, Sanpete Co., Indianola (Tanner), and Washington Co., Zion National Park; 1 species, St. George (Tanner); 1 species, Washington (Tanner); 1 species, Zion National Park (Tanner).

**Geron** Meigen 1820

In the genus **Geron** the costal cell is narrow, Rs forks before the r-m cross-vein, media has only two branches

(no cell M-1 present) and vein R-2+3 is free to the edge of the wing; cell R is nearly twice as long as 2M; sectoral cross-vein not present and cell 1A is closed (Fig. 39). The antennae have the third joint broadest at the base, and tapering to apex, style if present is on the apex of this segment (Fig. 23). They are mostly short, thick-set species with the abdomen somewhat conical.

This genus is represented in Utah by at least four species, but due to their small size and fragility no determinations have been possible on these species. Because of this locality records only are given in this paper.

Distribution: Utah, published record on **Geron** sp. Boxelder Co., Paradise, August 1925 (Knowlton).

New records: One species, Boxelder Co., Promontory, August 1930 (Knowlton); Daggett Co., Green River (Anson Call Jr.); Washington Co., 1 species, La Verkin (Tanner), 1 species, St. George (Tanner).

### **Rhabdoselaphus** Bigot 1886

The wing of this genus and that of **Geron** Meig. are almost identical save in one or two points. The humeral cross-vein is very long, and the costal cell is decidedly widened at that point. Cell R is just longer than 2-M, and cell R-4 is a long, narrow cell in this wing (Fig. 38). The wing as a whole is short and broad compared with a **Geron** wing. It is in the antennae where the chief difference lies, **Rhabdoselaphus** having the third joint broadly rounded or truncated apically, and the style in a shallow notch near upper angle (not apex) (Fig. 22).

Two species are found in Utah. The males and females of this genus vary considerably so each is run separately in the key.

### Table of Species

1. Males ..... 2
   Females ..... 3

2. Mostly cinereous species, mesonotum with distinct broad black vittae ..... **mitis** Cress.

   Distribution: Utah, new record: Washington Co., Washington (Tanner).

   Mesonotum cinereous, at most narrowly bivittate or faintly marked, larger (3 mm.), robust pilose species ..... **knabi** Cress.

   Distribution: Utah, new record: Washington Co.,

St. George (Tanner).

3. First antennal joint, anterior half of frons, humeri, and scutellum yellow ..... **knabi** Cress.

These parts black, more or less densely cindereous; mesonotum narrowly bivittate and with large sublateral spots; subopaque, black ..... **mitis** Cress.

**Toxophora** Meigen 1802

The wing in this genus has a very distinctive venation (Fig. 43). Rs forks far before the medial cross-vein making cell R very long; the free part of R-4 before the sectoral cross-vein, runs crosswise of wing, vein M has only two branches; and cell 1A is closed. The antennae (Fig. 48) have the first joint very long and clothed with scales. The body is clothed chiefly with tomentum. Two species are known to occur in Utah and are separated as follows:

1. Medial cross-vein curved twice (Fig. 43); abdomen provided with a band of yellowish-gold tomentum extending from scutellum to apex of segment seven; each segment has black band of tomentum on each side of the yellow, then white outside of the black; tomentum of legs black and white ..... ..... **virgata** O. S.

Distribution: Utah, new records: Utah Co., Provo (Johnson); Washington Co., St. George, May 24, 1919, Zion National Park (Tanner).

2. Medial cross-vein bent at right angle, the angle bearing a spur parallel to vein M-1+2; segment two of abdomen with a black pattern three-fourths of the width of the segment, following segments with a small black spot on each side of a medial band of light tomentum; light dorsal tomentum of segments one and two, and sometimes three and four yellowish to golden, rest white; legs, especially tibiae, provided with brown tomentum. ..... ..... **pellucida** Coq.

Distribution: Utah, new record: Utah Co., Provo (Johnson).

**Mythicomyia** Coq. 1893

This genus is notable for its very short vein R-1, the venation is shown in Fig. 37. The antennae are also very different from those of the other Bombyliidae, the second joint being notably long (Fig. 19). Williston (1908) says of the genus:

"The aberrant genus **Mythicomyia** described as

an empidid, may possibly belong in this family. Without expressing an opinion as to its real relationships, it will be easily recognized by its very short second longitudinal vein, and its single submarginal cell."

Brues and Melander in their recent "Classification of Insects", place this genus in a separate subfamily of the Bombyliidae. (See also Greene, C. T., Proc. Entomological Society, Washington D. C., Vol. 26:60-64.)

**Mythicomia scutellata** Coq.

Distribution: Utah new record: Washington Co., Washington (Tanner).

## SUMMARY

1. This is the first work to be done on the Bombyliidae of Utah with the exception of a list of nineteen species given by Knowlton (1931).

2. In this paper 118 species from the state of Utah have been considered, all but two of which are found in the Brigham Young University Collection, together with twelve other species found in the collection which are not represented from the state. These species are grouped into 22 genera, most of which contain few species. The genus **Villa** Lioy is the largest, containing 39 species.

3. Two new species are described in this paper as **Villa utahensis** and **Poecilanthrax painteri.** Drawings of the genitalia of the former species have been made to aid in identification.

4. Keys have been made to all of the genera, and to the species where there were more than one in a genus. Under each species locality records complete to date are given.

5. The general morphology and the antennae and wings have been figured to aid in identification and classification.

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## EXPLANATION OF ABBREVIATIONS

**Plate I and Fig. 58**

a..antenna
ca..calyptera
cl..claw
cx..coxa
dps..dorsopleural suture
fa..face
fe..femur
fr..frons (front)
g..genitalia
ha..halter
hc..humeral callus
hyp..hypopleura
hyx..hypopharynx
la..labrum
le..labella
lm..labium
mep..mesopleura
map..metapleura
mps..mesopleural suture
ms..mesonotum
mx..maxilla
mxp..maxillary palpus
oc..occiput
p..propleura
poc..postalar callus
pp..pteropleura
pr..proboscis
prc..prealar callus
s..spiracle
sac..supraalar callus
sc..scutellum
sp..sternopleura
st..sternite
ta..tarsus
te..tergite
ti..tibia
tr..trochanter
v..vertex
wb..wing base

**Plate I, Fig. 8, and Plate II**

The wings have been labeled according to the Comstock-Needham system.

poc..posterior arculus
s..sectoral cross-vein
pc..precostal cell

**Plate III**

au..anus
ds..dististylus
p..proctiger
pp..paraproct
s..spines
st..sternite
t..tergite
v..vulva
x..aedeagus

## Plate I.

Fig. 1. **Villa alternata** (Say), lateral view.
Fig. 2. **Villa alternata** (Say), ventral of thorax.
Fig. 3. **Villa alternata** (Say), dorsal of thorax.
Fig. 4-6 **Villa alternata** (Say), legs.
Fig. 7. **Lepidanthrax disjuncta** Wied., mouthparts.
Fig. 8. **Systoechus oreas** O. S., wing.
Fig. 9-24. Antennae of the following: (All are drawn from above, and are from right of head.)
Fig. 9. **Villa alternata** (Say)
Fig. 10. **Exoprosopa xanthina** Painter
Fig. 11. **Systoechus oreas** O. S.
Fig. 12. **Anastoechus barbatus** O. S.
Fig. 13. **Bombylius lancifer** O. S.
Fig. 14. **Anthrax tigrina** (de Greer)
Fig. 15. **Lepidanthrax disjuncta** Wied.
Fig. 16. **Phthiria humilis** O. S.
Fig. 17. **Sparnopolius coloradensis** Grote
Fig. 18. **Lordotus gibbus** Loew

Fig. 19. **Mythicomyia scutellata** Coq.
Fig. 20. **Conophorus amabilis** (O. S.)
Fig. 21. **Aphoebantus** sp.
Fig. 22. **Rhabdoselaphus knabi** (Cress.)
Fig. 23. **Geron** sp.
Fig. 24. **Heterostylum robustum** (O. S.)

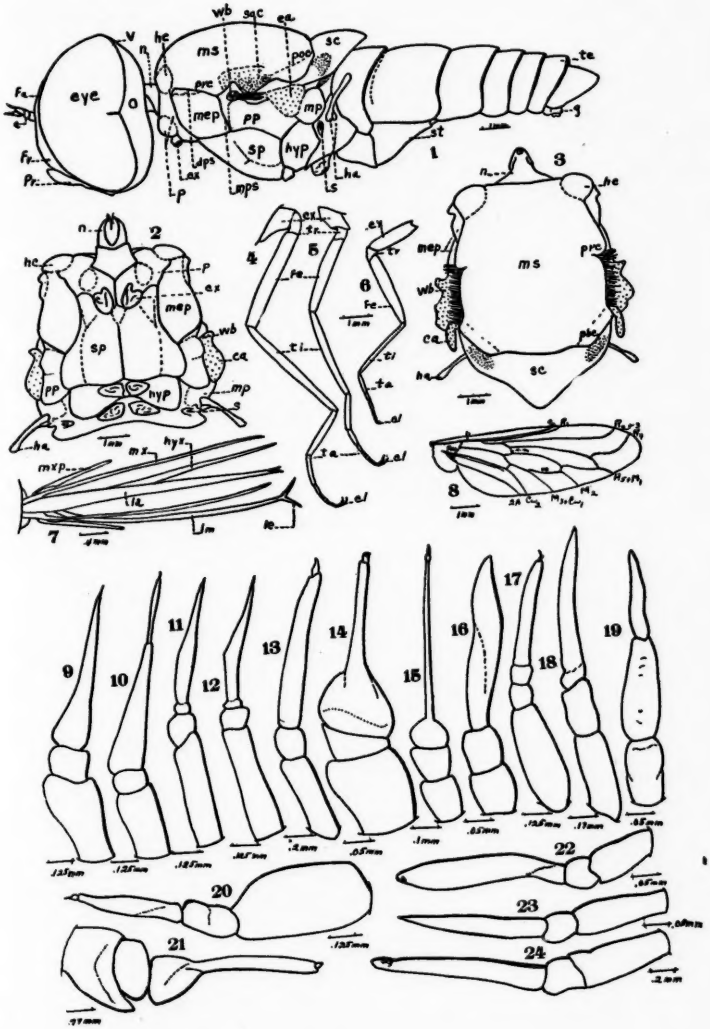
**Plate II**

Wings of the various genera of Bombyliidae:
Fig. 25. **Anthrax seriepunctata** (O. S.)
Fig. 26. **Exoprosopa xanthina** Painter
Fig. 27. **Villa alternata** (Say)
Fig. 28. **Dipalta serpentina** O. S.
Fig. 29. **Eclimus ostensackenii** Burgess
Fig. 30. **Sparnopolius coloradensis** Grote
Fig. 31. **Phthiria humilis** O. S.
Fig. 32. **Conophorus amabilis** (O. S.)
Fig. 33. **Heterostylum robustum** (O. S.)
Fig. 34. **Bombylius lancifer** O. S.
Fig. 35. **Lordotus gibbus** Loew
Fig. 36. **Lepidanthrax disjuncta** Wied.
Fig. 37. **Mythicomyia scutellata** Coq.
Fig. 38. **Rhabdoselaphus knabi** (Cress.)
Fig. 39. **Geron** sp.
Fig. 40. **Aphoebantus** sp.

**Plate III**

Fig. 41. **Villa cauter** (Coq.), wing.
Fig. 42. **Villa utahensis** n. sp. wing.
Fig. 43. **Toxophora virgata** O. S., wing
Fig. 44. **Villa cautor** (Coq.), head.
Fig. 45. **Villa cauter** Coq., antenna.
Fig. 46. **Villa utahensis** n. sp., antenna.
Fig. 47. **Villa utahensis** n. sp., head.
Fig. 48. **Toxophora virgata** O. S., antenna.
Fig. 49-50. **Villa utahensis** n. sp., ventral and dorsal aspects, female genitalia.
Fig. 51-52. **Villa utahensis** n. sp., lateral and caudal aspects, male genitalia.
Fig 53-54. **Villa cauter** (Coq.), ventral and dorsal aspects, female genitalia.

## Plate I.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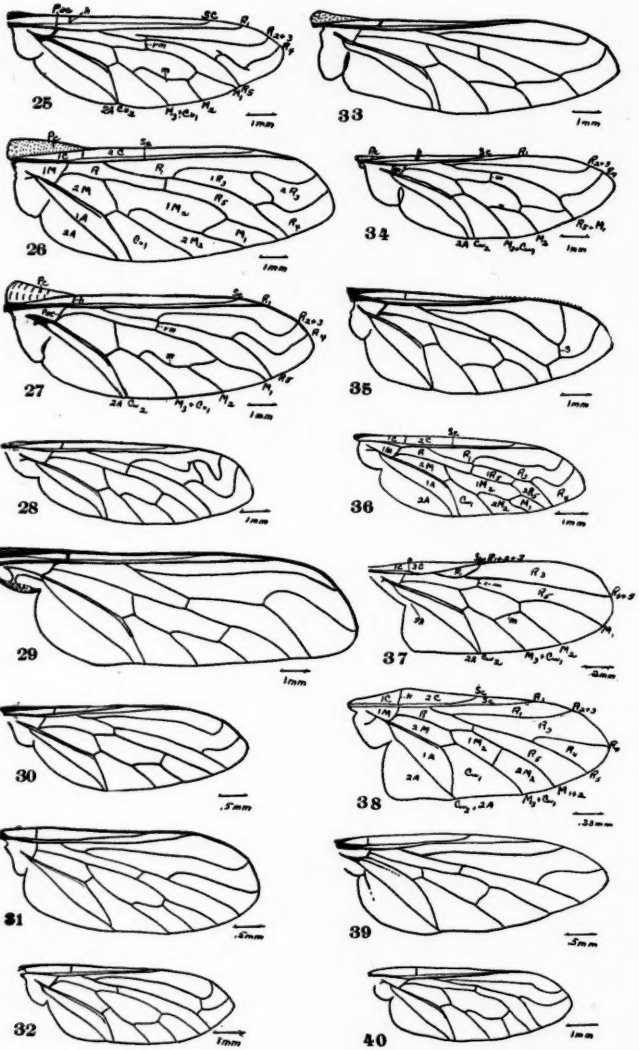
## Plate II.



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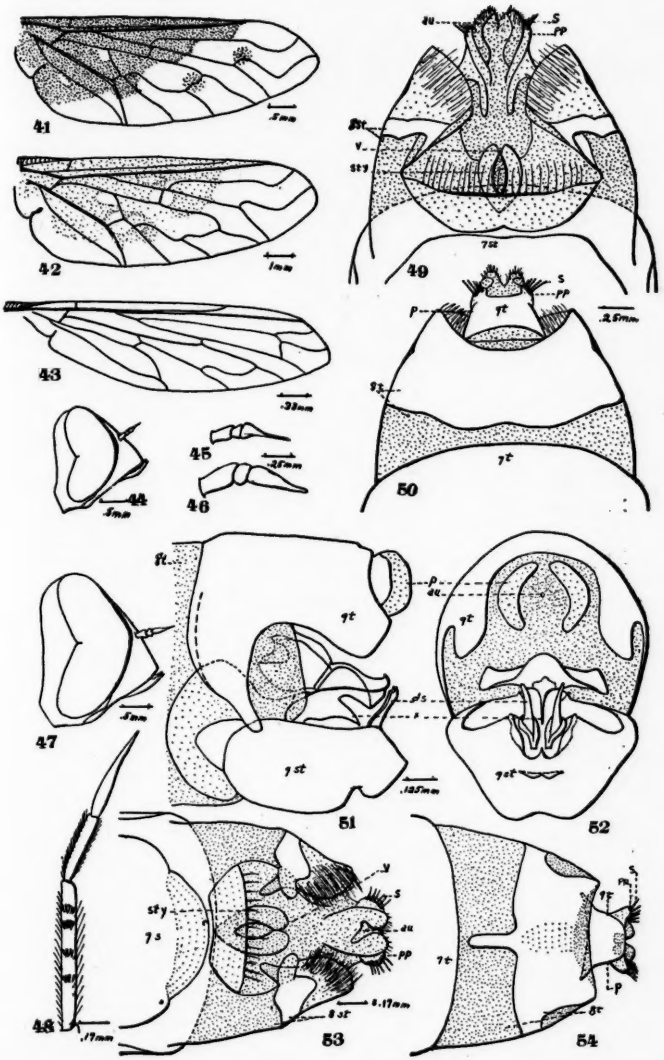

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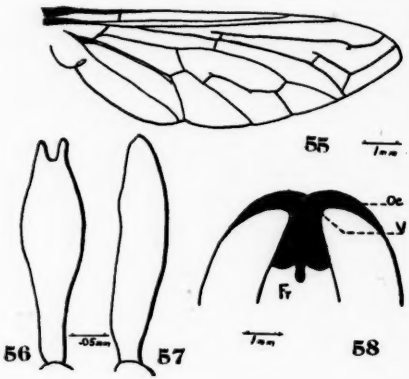


### Plate IV

Fig. 55. **Dicranoclista vandykei** (Coq.), wing.
Fig. 56. **Neacreotrichus simulis** (Coq.), third joint of antenna, side view.
Fig. 58. **Poesilanthrax painteri** n. sp., vertex of head.

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